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ATTACHMENT I
REQUIREMENTS FOR DIGITAL PHOTOGRAPHS OF SURVEY CONTROL

TO
SCOPE OF WORK FOR
HEIGHT MODERNIZATION AND LIDAR SURVEYS

NATIONAL GEODETIC SURVEY
NATIONAL OCEAN SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

ATTACHMENT I - REQUIREMENTS FOR DIGITAL PHOTOGRAPHS
OF SURVEY CONTROL

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I. PURPOSE - This document describes digital photographic standards for images of survey marks that will be stored in the National Geodetic Survey (NGS) database and for other reconnaissance photographs. Since many of these images will be in the NGS database and available to the public, the subject matter (survey equipment, personnel, background, etc.) must be in good taste and professional in nature.

Digital photographs are useful for station (mark) reconnaissance, mark recovery, mark stability assessment, quality control, and as an aid during data processing and data verification. Some projects may require digital photographs during several stages of the project. Generally three photographs per station will be stored in the NGS database, which will make them accessible to future users. The table below summarizes the required photographs. Detailed descriptions of the photographs follow.

II. SURVEY MARK PHOTOGRAPHS - Take all photographs during daylight hours.

II A. NUMBER OF PHOTOGRAPHS - At least three digital photographs are required for each mark recovered or described during the current project. This means marks for which a written, NGS format, digital description or recovery note was prepared. The three photographs are described as numbers: (1) extreme close-up, (2) eye-level (5-6 feet distant), and (3) horizontal view (approx. 10-30 feet distant). All three photographs require a digital caption and the correct file name. Photographs 2 and 3 require a **small, temporary sign** in the photograph.

REQUIRED PHOTOGRAPHS

All Marks Recovered and/or Described
1. Close-up (Taken Vertically)
2. Eye level (Taken Vertically)
3. Horizontal view(s), mark in foreground

Take sufficient photographs to describe the stamping, appearance, condition, and location of the mark and points of potential interest including visibility obstructions, roads, runways, taxiways, or other dangers, any special set-up requirements, etc. Alter the orientation of the photographs as necessary to include this information in as few photographs as possible (For example, for a tall obstruction, rotate the camera 90 degrees so that the long axis of the image is vertical). Capture the tops of nearby obstructions, if possible. If a station already has acceptable photographs in the NGS database, additional photographs are not required, unless changes have occurred or more than one year has passed. An "acceptable photograph" is defined as an image that meets the requirements of this document, is of good visual quality, and that no changes have taken place that a new photograph would help clarify.

II B. CAPTION - The photographer shall write a caption for each photograph. The caption should contain the following comma-separated information:

- Station designation (name),
- Station Permanent IDentifier (PID), for existing stations in the NGS database, leave blank if new station,
- Airport Location IDentifier (LID), if on airport, leave blank if not on airport,
- Photo number with cardinal direction (N, NE, E, SE, etc) that the camera is pointing, only photo #3 has a direction
- Station type (i.e. PACS, SACS, FBN, CBN), otherwise leave blank
- Date photo was taken (ddMMMyyyy).

SAMPLE CAPTION FOR NEW MARK

JONES, 2, 8JAN2001

SAMPLE CAPTION FOR EXISTING PACS ON AIRPORT

SMITH, AB1234, LAX, 3N, PACS, 8JAN2001

Note, the cardinal direction should not be included on photographs 1 and 2 since they were taken vertically.

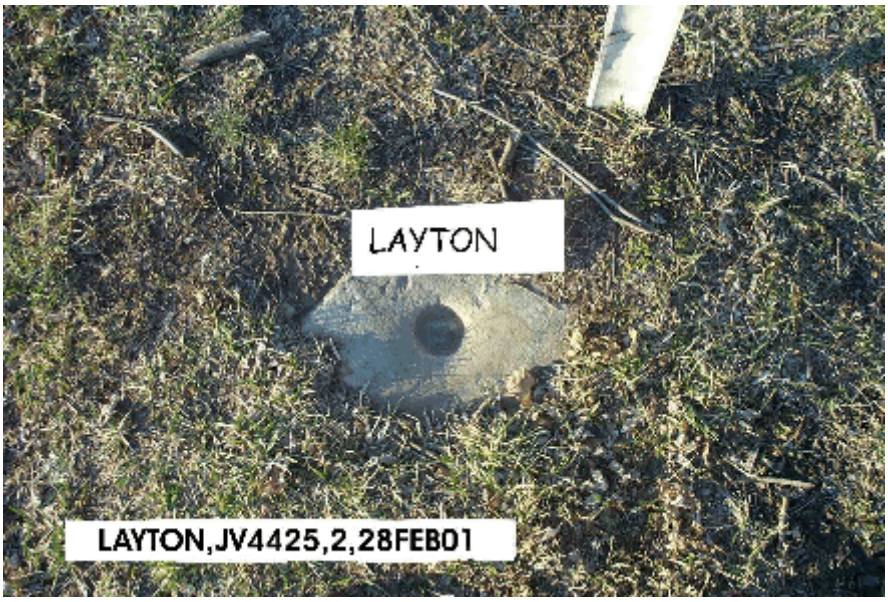
The caption may be digitally captured on the image at the time of exposure or may be inserted later, off-line. Record at least the date on-line, if possible. If caption information is added later, take careful notes at the time of exposure to help ensure that the correct caption is added. **Note, the caption shall not obstruct any pertinent aspects of the station or surroundings.** To ensure that the letters of the caption are visible, use software to "erase" a rectangular area for the caption's lettering; see samples below.

II C. DESCRIPTION OF PHOTOGRAPHS:

1. CLOSE-UP - For survey marks, the first photograph (photo no.1) will be a close-up, taken vertically. It will be oriented downward to show the survey mark from directly above with the disk or logo cap nearly filling the image. Brush any dirt or debris off the mark to show the disk. If it has a logo cap, the logo cap should be open. The intent of this photograph is to clearly show the condition of the mark and all stamping on the mark or logo cap so that it is clearly legible. Use extra care to ensure that the stamping is clear. Suggestions: set the camera to its highest quality and resolution modes; **rub a**

yellow crayon across the stamping to highlight the letters; set the camera to "macro" mode, if available; consider the minium focusing distance of the camera (take test photographs to determine the minimum focusing distance and consult the camera owner's manual) ; and, if a flash is used, hold the camera above and off to the side so that the flash does not create a bright spot in the middle of the disk's image. Note, medium quality and resolution camera modes may be used for photographs other than the close-ups. If additional photographs are required, number these close-ups as 1A, 1B...

2. EYE-LEVEL - For survey marks, this photograph (photo no.2) will be oriented vertically downward from eye level to show the monument from directly above and cover an area about 1 meter in diameter. Brush any dirt or debris off the mark to show the disk and the setting, If it is a concrete monument, clear off debris to the edge of the monument. If it has a logo cap, the logo cap should be open. **Include a small, temporary sign in this photograph with the station designation (name) printed so it is clearly visible in the photograph.** The intent of this photograph is to show the general condition of the mark and the immediate surrounding area. If additional photographs are required, number these eye-level photos as 2A, 2B...



3. HORIZONTAL VIEW(S) - For survey marks, take at least one additional, daylight photograph oriented near horizontal, and show the mark, with tripod and antenna (if possible), in the foreground, and its identifying surroundings and any significant obstructions or possible sources of multi-path in the background. Show the top of nearby obstructions, if possible. Consider rotating the camera 90 degrees to use the long axis of the image to capture an entire obstruction. **Place a temporary sign in this photograph with the station designation (name) and the direction the camera is pointing, both printed so they are clearly visible in the photograph.** If additional photographs are taken, ideally move around the mark to locations which are 90 degrees apart (preferably cardinal directions). Name these photographs number 3XX, where the "XX" is the cardinal direction the camera is pointing, for example, 3N or 3NE.

II D. FILE NAMES - See Section IV D.

III. RECONNAISSANCE PHOTOGRAPHS - Some or all of the digital images described in this section may be required on a given project; refer to the Project Instructions. Each of these photographs requires a sign, a caption, and the correct file name. The names for all of these files shall begin with "RE" to indicate reconnaissance.

Required Item	Contents	Description
Sign in Photo	Name & Direction (unless vertical photo)	Place a sign in this photograph with the station designation (name) and the direction the camera is pointing, both printed so they are clearly visible in the photograph.
Digital Caption	Name, PID, LID, Number, Type, Date	See Section II.B above
Photo File Name	RE-Name-PID-Number-Date.jpg	See Section IV.D below

All of the images required by this section shall be designated as reconnaissance (recon) with the letters "RE" at the beginning of their file names. Generally these recon images will not be loaded in the NGS data base but may be required for use during planning, review, etc. All reconnaissance photographs will have digital captions. These captions may be captured on the image or added later. Note, in these specifications, **"RE" stands for "reconnaissance"** and "R" stands for "right" runway.

See the Project Instructions to determine which of the following are required:

III. A. PROPOSED LOCATIONS FOR MARKS - Take two photographs of each proposed permanent mark location. These may be one photo number 2 and one number 3, or two number 3 (3A and 3B), depending on which combination better shows the proposed mark location. Include a tripod, stake, sign, or other device showing the proposed mark location.

III. B. RUNWAY END PHOTOGRAPHS - Take at least three photographs at the end of each runway (including thresholds and stopways) surveyed in the current project, as follows:

- Eye-Level (photo type #1) - photo from directly above the mark, showing about 1 meter in diameter,
- Approach (photo type #3) - photo showing tripod over mark in foreground and approach in background
- Across runway (photo type #3) - photo taken from the side of the runway looking across the end of the runway, with a tripod or arrow indicating the end point; include any features used to identify the runway end.

III. C. NAVIGATION AIDS (NAVAIDS) - Take photo(s) (type #3) of all NAVAIDS surveyed. Show the survey tripod in place to indicate the exact point surveyed, or if positioned remotely, add arrows and labels to the photograph indicating the horizontal and/or vertical point(s) surveyed.

III. D. DEPTH OF HOLE PHOTOGRAPHS - Take at least one photograph showing the hole dug or drilled for a concrete or rod mark. Place a measuring device (e.g., tape measure or level rod) in the hole, clearly showing the depth of the hole.

III.E. PHOTOGRAMMETRIC CONTROL POINTS (Paneled and photo identified) - Take two number 3 type photographs of all photogrammetric control points clearly showing the point. These photos will be used later as an aid in identifying the point on the aerial photographs. Show the mark in the foreground and the nearest identifiable feature in the background. The two photographs should be taken from two different directions, ideally 90 degrees apart (such as from the East and the South).

III.F. OTHER REQUIRED PHOTOGRAPHS - as may be required by other instructions.

IV. GENERAL:
IV A. IMAGE SIZE - Each image should be about 800 by 1000 pixels when submitted.

IV B. 2. FILE SIZE - Maximum file size for each image is 500 KB, typical file size should be about 50 - 100KB.

IV C. IMAGE FORMAT - Store the digital photographs in JPEG format, approximately 50% reduction.

IV D. PHOTOGRAPH FILE NAME - Use the following file naming convention: the optional "RE" (for reconnaissance), dash, the station designator, dash, the PID, dash, the photo number (1, 1A, 2, 3N, or 3NE, etc.), dash, date, dot, jpg. For new marks, there is no PID. Use a maximum of 30 alpha-numeric characters to the left of the dot.

Sample File Names

For new stations:	SMITH-3-date.jpg
For existing stations:	SMITH-AB1234-1-date.jpg
For recon photos:	RE-SMITH-AB1234-3-date.jpg
For runway end point:	RE-LAX_CL_END_RWY_12R-3-date.jpg

For the runway end point example, "RE" = reconnaissance, dash, LAX = LID, dash, "CL END RWY 12R" = runway end point designator (CL = centerline, END = end, RWY = runway, 12 = runway number, and R = right (or C = center, or L = left), dash, "2" = photo number, and date. Note, "_" (underscores) used to fill blanks. Note, in these specifications, "RE" stands for "reconnaissance" and "R" stands for "right" runway (used if there is a parallel set of runways). Also, the LID may be four characters rather than just three.

V. STORAGE MEDIUM - Submit all digital photos together on their own medium (CD), **not on the same medium with other types of data**. For airport work, submit all photos for a given airport in a subdirectory named for that airport.

*Aconyms:
PACS - Primary Airport Control Station
SACS - Secondary Airport Control Station
FBN - Federal Base Network
CORS - Continuously Operating Reference Station (Global Positioning System receiver)
CBN - Cooperative Base Network
RM - Reference Mark